MESSRS. GEORGE BELL AND SONS have published a third edition of Mr. W. M. Baker's "Elementary Dynamics." Except that a number of minor corrections have been made, this edition appears not to differ from the second.

WE have received the forty-first volume, that for 1907, of the Journal and Proceedings of the Royal Society of New South Wales. The meetings of the society are reported from time to time in these columns under "Societies and Academies," and it is sufficient to direct attention to the publication of the annual volume.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN AUGUST:—

Aug. 1. 11h. 28m. Minimum of Algol (β Persei).
4. 8h. 17m. " " "
8. 6h. 41m. to 7h. 54m. Moon occults 4 Sagittarii (mag. 4·6).
9. 8h. 31m. Moon in conjunction with Uranus (Uranus 0° 24′ N.).
10–12. Maximum of the Perseid meteors (Radiant 45° + 57°).
11. 12h. Venus at greatest brilliancy.
14. 23h. 53m. Moon in conjunction with Saturn (Saturn 2° 46′ N.).
16. Saturn. Outer minor axis of outer ring = 5″·84. Polar diameter of ball = 17″·6.
18. Venus. Illuminated portion of disc = 0·327.
24. 10h. 0m. Minimum of Algol (β Persei).
27. 0h. Vesta in conjunction with Moon (Vesta 0° 21′ S.).
31. 3h. Ceres in conjunction with Moon (Ceres 0° 31′ N.).

EARLY PERSEIDS.—Mr. Denning, at Bristol, observed the first traces of the great August meteor shower on July 21, but no signs of it were apparent during watches maintained over a part of the nights of July 18 and 19. On July 25 meteors were very rare in a beautifully clear sky, but on July 22 and 26 they were numerous, and supplied evidence of several active minor showers at 298° − 15°, 280° + 57°, and 303° + 24°. On July 26 the Perseid display had assumed very decided prominence, for it furnished during the two hours preceding midnight about four meteors per hour within the sphere of vision commanded by a single observer. The radiant point appeared diffused over an area with centre at 25° + 53°, which agrees very nearly with the computed place of the shower centre on July 26.

A bright flashing Perseid, nearly equal to Jupiter, was recorded at 10h. 23m. on the night mentioned crossing the Milky Way in the south-west region of Aquila, the path being from 287° + 3° to 278° − 11°, where it left a bright streak for a few seconds. A bright star meteor from a southern radiant was seen at 11h. 33m. moving from 350° + 6° to 17° + 20½°, and at 11h. 49m. an Aquarid shot upwards close to γ Pegasi. A radiant at 45° + 85°, near Polaris, became well defined on the same night.

LARGE METEORS FROM SCORPIO.—In a letter to the July *Observatory* (p. 287, No. 398) Mr. Denning directs attention to the recent apparition of several large meteors coming from a radiant apparently situated in the constellation Scorpio. So far back as June 7, 1878, Mr. Denning's attention was directed to this radiant by the appearance of a large meteor, and since then he has regularly observed it, and has seen several very attractive meteors from it.

This year two fireballs from this radiant were observed, on May 19d. 10h. 20m. and May 22d. 8h. 50m. respectively, and duplicate observations show that the former passed over Ireland, from Ballyteigne Bay to co. Mayo, at a height of about sixty-nine to forty-five miles, along a path 142 miles in length; the radiant was in the region of 252°, −22°. Mr. Denning suggests that observations of this radiant in future years will amply repay the observers by providing them with brilliant meteoric phenomena at a season of the year when such phenomena are neither plentiful nor conspicuous. On the day of the partial solar eclipse, June 28, Mr. Denning saw a magnificent meteor, directed from Scorpio, which occupied seven seconds in passing from 276°, +23°, to 1°, +48½°, and cast off a bright trail of yellow sparks.

THE RECENT NIGHT-GLOWS.—Several accounts of observations of the night-glows which were seen, about the beginning of the present month, by observers throughout mid-Europe appear in No. 4262 of the *Astronomische Nachrichten* (p. 239, July 16).

Prof. Weber, of Kiel University, reports that no marked, irregular oscillations of the magnets were registered, but from June 27–30 small regular oscillations of 2′ amplitude and 3m. period were observed at intervals, and were not ascribable to any recognised cause.

Herr Köhl, of the Carina Observatory, Denmark, suggests that the solar illumination of cometary dust in the higher atmosphere might account for the phenomenon, and in this connection directs attention to the fact that several very large meteors were recently observed in Denmark.

Herr N. Donitsch states that on June 30 a fine aurora borealis was seen at Starya Doubossary, Bessarabia, and was visible from 11h. 10m. p.m. (local time) until dawn. The maximum illumination was a few degrees east of north, and suffered several variations; filaments, changing rapidly in form, were also seen.

DOUBLE-STAR MEASURES.—No. 4261 of the *Astronomische Nachrichten* contains further micrometer measures of double stars made by Prof. Burnham since the publication of his General Catalogue. The main idea of these observations is to establish beyond doubt the existence, or absence, of relative change of any kind in the lesser known and often neglected pairs. With this idea, the present list, as did the former, contains a note on each system indicating the nature and amount of any change which has been discovered.

THE HISTORY OF LUNAR RELIEF.—Charged with the task of bringing to completion the Lœwy-Puiseux "Atlas photographique de la Lune," M. Puiseux is preparing the text which is to accompany the work. Whilst studying the photographs for this purpose, he has been struck by the peculiar formations surrounding the northern pole of our satellite, and finds in them and their structure a possible key to the history of lunar formations in general. These rectangular formations, prominent in the region of Anaxagorus, M. Puiseux concludes to be typical of the earlier types of lunar structure, since modified, in other latitudes, by subsequent action, and he shows in a note published in No. 2 of the *Comptes rendus* (p. 113, July 13) how they were probably formed by the contortions of the thin superficial crust. M. Puiseux does not, in the present note, discuss the reason why the period of structure-formation should be a function of latitude, but points out that in this respect the earth affords a parallel case.

MINERALS, INCLUDING GEM-STONES, AT THE FRANCO-BRITISH EXHIBITION.

SCIENCE and commerce regard minerals from two very different points of view, and many of the specimens to which much prominence is given at the Franco-British Exhibition—such as, for instance, the ubiquitous masses of silver-bearing galena—would find no place in a purely mineralogical collection. Commerce is concerned only with the ore value of the specimens, and attaches no importance to the presence of crystals or to their form and symmetry. On the other hand, in a museum specimens are arranged by the most interesting or the best developed species displayed on them, and it is impossible to realise at a glance what precisely are the minerals found in some particular quarter of the globe. Thus collections that are representative of the mineral products of various countries cannot fail to be of interest, from whatever point of view they may be considered; moreover, here and there the mineralogist will note with appreciative eye a well-crystallised specimen.

Most of the minerals will be found at the far end of the extensive grounds in the spacious halls of the Dominion of Canada and the Commonwealth of Australia. In the former, a singularly tasteful hall, the collection of minerals is the property of the Government, and is permanently

kept together for sending to great exhibitions in order to testify to the mineral resources of the country; specimens are added from time to time to replace breakages and to represent newly opened mines. The small specimens are arranged in flat table-cases; of the large specimens, the more valuable are placed in large upright cases, and the remainder are piled near by in the open court. Information as to the nature of the ore, and in some instances the minerals present and the locality, is given on the labels accompanying the specimens. We may pass over the gold specimens from British Columbia and the Yukon district, and direct attention to the extensive series of silver associated with smaltite, niccolite, erythrite, &c., from the rich mines of Temiskaming, Ontario, first discovered five years ago. Some large crystals of phlogopite and apatite, and a small polished piece of beautiful blue sodalite, may be noticed.

In the Australia Hall the several component States have worked in their own courts independently, and not always on similar lines. In the Western Australia court the organisation and arrangement of the minerals have been managed entirely by the Government, and the result, as regards both the type of show-case and the selection and labelling of the specimens, is admirable. The gold industry naturally takes a prominent position. Some rich specimens of tellurides are shown, but they reveal no signs of crystal form. At the somewhat analogous district of Cripple Creek the telluride of gold, calaverite, occurs in many-faced crystals, the symmetry of which has been such a baffling problem. The tantalite from Greenbushes is interesting as the source of the filament of the new electric lamp; generally it is found in curiously marked massive pieces, but one or two specimens show unmistakable indications of crystal form. A huge lump, said to be only a portion of the original mass, testifies to the size attainable by tin-stone. At the principal entrance to the Queensland court are placed cases containing both rough and cut examples of the gem-stones found in the southern and central districts, viz. opal, colourless topaz, green and yellow sapphire, pink and green tourmaline, and pale green beryl. Conspicuous among them is the novel "black opal," which is of various shades to the deepest blue, and flames with vivid opalescence. Among the ore specimens at the further end of the court may be noted a bright wolframite and a fine bismuth. The gem-stones occurring in New South Wales are very similar to those just mentioned; perhaps the best black opal, of which some exceptional specimens are exhibited, comes from Lightning Ridge. Few good specimens from the famous Broken Hill mines are to be seen, and the arranging and labelling in at least two of the show-cases leave much to be desired.

Time, unfortunately, has not permitted of the organising of a collection of typical minerals in the India Hall. The Ruby Mines, Ltd., however, exhibit a magnificent series of rough and cut rubies and sapphires from Burma; no attempt is made to distinguish between the species corundum and spinel. Those interested in minerals will find much to attract them in the finely-crystallised specimens from the new lead and zinc mines at Broken Hill, North-Western Rhodesia, exhibited by Mr. Percy C. Tarbutt in the British Science Hall. They will see the zinc phosphates, hopeite, previously to the discovery of these mines known only by a few rare crystals, and tarbuttite, a new species, which was named after the exhibitor by Mr. L. J. Spencer, who recently described this remarkable mineral occurrence. In the same case Mr. Arthur Russell shows some minerals from the British Isles, mostly from abandoned mines or unrecorded localities, and Mr. F. N. A. Fleischmann exhibits a series of zeolites from the basaltic lava near Belfast.

Probably never before has such a superb collection of fashioned gem-stones been brought together for public view as are exhibited in the French and British Applied Art Halls. Space, however, permits us to direct attention only to the remarkable series of coloured diamonds exhibited by M. Eknayan in the former hall.

G. F. H. S.

PROTECTIVE DEVICES FOR HIGH-TENSION TRANSMISSION CIRCUITS.

IN the Journal of the Institution of Electrical Engineers issued in June (vol. xl., No. 189), Mr. J. S. Peck describes some methods in use for protecting high-tension transmission circuits from lightning and other high-voltage discharges. The development of apparatus for this purpose has received little attention in Great Britain owing to the fact that there are comparatively few overhead systems working at pressures greater than 11,000 volts, and severe thunderstorms are of very rare occurrence. On the Continent and in America, however, where very high voltages are used in overhead systems, and where thunderstorms are more frequent and severe, it has been essential for the success of transmission to develop considerably such protective devices.

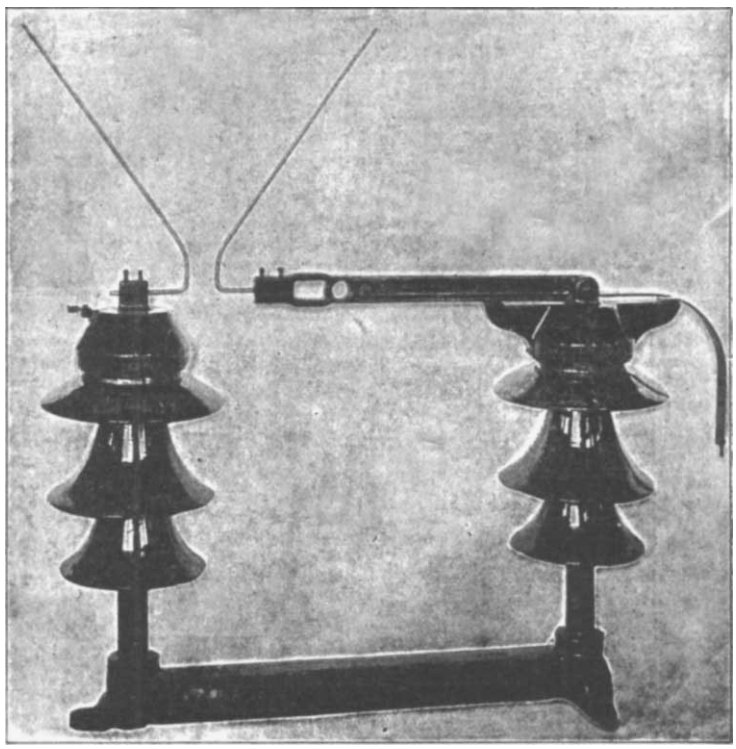

FIG. 1.—Horn-type gap.

Generally speaking, the effect of a lightning discharge on the circuit will be to cause a large increase of potential at certain points. Should the line insulation be insufficient, the charge may jump to earth, shattering poles, but probably protecting the apparatus at the end of the line from damage. If there is no escape in this direction, then there is the possibility of the insulation of the end apparatus breaking down, which is very serious.

Similar dangers may arise from sudden shorts in the system itself, and in dry climates the wind blowing over the transmission wires has been found to build up a high static potential. It is essential, then, to devise apparatus (1) to prevent concentration of potential at the end wind-